II-3 Soil Rating for Nitrate and Soluble Nutrients

Introduction

This section provides a way to determine the degree to which water percolates below the rootzone in certain soils. Percolating water containing dissolved nitrates or other soluble nutrients could be a hazard to ground water. The method is based on a Leaching Index (LI)[1].

For areas with ground water concerns, the LI should be determined to evaluate the potential for contaminating the ground water with soluble nutrients. The LI uses annual precipitation, hydrologic soil group, and rainfall distribution data.

Leaching index

A LI map for each hydrologic soil group was developed for each state and is being provided during the Water Quality workshops. The hydrologic group describes those soils that do not have dual hydrologic ratings because of differences in drainage. Soils with hydrologic rating such as A/D should be evaluated on the basis of the current drainage status. If the soil has a high LI and is over a shallow aquifer, soluble nutrients-- especially nitrates-- may contaminate the water.

The LI does not account for irrigation. If irrigation is applied only to supply plant needs, there will be little additional loss below the rootzone. The additional loss would be relative to the precipitation events after the soil profile is saturated or nearly saturated due to irrigation.

In areas of marginal water quality, the amount of irrigation water applied includes a leaching fraction to insure that salts do not build up in the soil. If a leaching fraction is applied, this amount of water must be added to the LI. For example, if the leaching fraction is 1.2 and irrigation is applied to make up a 4 inch soil-water deficit, a 4.8 inch (1.2 x 4.0 in) irrigation would be applied. The LI should be increased by 0.8 inches. The same calculation must be made for each irrigation.

Procedure

Follow these steps to determine the leaching index of a certain soil:
1. Find the soil's hydrologic group.
2. Locate the iso-leaching map for that group.
3. From the map, based on the soil location, determine the LI.

[1]The method to calculate the Leaching Index was developed by J. R. Williams and D. E. Kissel in "Water Percolation: An Indicator of N Leaching Potential", from *Managing Nitrogen For Groundwater Quality and Farm Profitability*, Edited by R. F.Follet (Unpublished).

Guidelines for recommendations:

A LI below 2 inches would probably not contribute to soluble nutrient leaching below the rootzone.

A LI between 2 and 10 inches may contribute to soluble nutrient leaching below the rootzone and nutrient management should be considered.

A LI larger than 10 inches will contribute to soluble nutrient leaching below the rootzone. Nutrient management practices should be intense or soluble nutrients should not be applied. Also, consider using conservation practices that minimize infiltration, such as strip cropping rather than pipe outlet terraces.